

## SEQUENCE LISTING

<110> Vanderbilt University  
Hallahan, Dennis E  
Mernaugh, Raymond

<120> PHAGE ANTIBODIES TO RADIATION-INDUCIBLE NEOANTIGENS

<130> 1242/72

<150> US 09/914,605

<151> 2001-08-30

<150> US 10/259,087

<151> 2002-09-27

<160> 34

<170> PatentIn version 3.2

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 Gly Ala Ser Val Lys Met Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr  
 20 25 30

gac tac tgg atg cac tgg gtg aag cag agg cct gga caa ggc ctt gag 144  
 Asp Tyr Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu  
 35 40 45

tgg atc gga gcg att gat act tct gat agt tat act agc tac aat caa 192  
 Trp Ile Gly Ala Ile Asp Thr Ser Asp Ser Tyr Thr Ser Tyr Asn Gln  
 50 55 60

aag ttc aag ggc aag gcc aca ttg act gta gac gaa tcc tcc agc aca 240  
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 Ala Tyr Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr  
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tac tgt gca aga aga ggc tac tat agc gca ttt gat tac tgg ggc caa 336  
 Tyr Cys Ala Arg Arg Gly Tyr Tyr Ser Ala Phe Asp Tyr Trp Gly Gln  
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 Gly Thr Thr Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly Gly  
 115 120 125

ggc tct ggc ggt ggc gga tcg gac att gag ctc acc cag tct cca aca	432
Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu Thr Gln Ser Pro Thr	
130 135 140	
acc atg gct gca tct cca gga gag aag gtc acc atc acc tgc cgt gcc	480
Thr Met Ala Ala Ser Pro Gly Glu Lys Val Thr Ile Thr Cys Arg Ala	
145 150 155 160	
agc tca agt gta agc tac atg cac tgg ttc cag cag aag tca ggc acc	528
Ser Ser Ser Val Ser Tyr Met His Trp Phe Gln Gln Lys Ser Gly Thr	
165 170 175	
tcc ccc aaa ccc tgg att tat gac aca tcc aag ctg gct tct gga gtc	576
Ser Pro Lys Pro Trp Ile Tyr Asp Thr Ser Lys Leu Ala Ser Gly Val	
180 185 190	
cca gat cgc ttc agt ggc agt ggg tct ggg acc tct tat tct ctc aca	624
Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr	
195 200 205	
atc agc tcc atg gag gct gaa gat gct gct act tat tac tgt ctg cag	672
Ile Ser Ser Met Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Leu Gln	
210 215 220	
agg agt agt tac ccg tac acg ttt gga gct ggc acc aag ctg gaa atc	720
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Lys Arg	

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Asp Tyr Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu
35 40 45

Trp Ile Gly Ala Ile Asp Thr Ser Asp Ser Tyr Thr Ser Tyr Asn Gln
50 55 60

Lys Phe Lys Gly Lys Ala Thr Leu Thr Val Asp Glu Ser Ser Ser Thr  
65 70 75 80

Ala Tyr Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr  
85 90 95

Tyr Cys Ala Arg Arg Gly Tyr Tyr Ser Ala Phe Asp Tyr Trp Gly Gln  
100 105 110

Gly Thr Thr Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly Gly  
115 120 125

Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu Thr Gln Ser Pro Thr  
130 135 140

Thr Met Ala Ala Ser Pro Gly Glu Lys Val Thr Ile Thr Cys Arg Ala  
145 150 155 160

Ser Ser Ser Val Ser Tyr Met His Trp Phe Gln Gln Lys Ser Gly Thr  
165 170 175

Ser Pro Lys Pro Trp Ile Tyr Asp Thr Ser Lys Leu Ala Ser Gly Val  
180 185 190

Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr  
195 200 205

Ile Ser Ser Met Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Leu Gln  
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Arg Ser Ser Tyr Pro Tyr Thr Phe Gly Ala Gly Thr Lys Leu Glu Ile  
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Lys Arg

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Gly Ala Ser Val Lys Met Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr	
20 25 30	
agc tat gtt atg cac tgg gtg aag cag aag cct ggg cag ggc ctt gag	144
Ser Tyr Val Met His Trp Val Lys Gln Lys Pro Gly Gln Gly Leu Glu	
35 40 45	
tgg att gga tat att aat cct tac aat gat ggt act aag tac aat gag	192
Trp Ile Gly Tyr Ile Asn Pro Tyr Asn Asp Gly Thr Lys Tyr Asn Glu	
50 55 60	
aag ttc aaa ggc aag gcc gca ctg act tca gac aaa tcc tcc agc aca	240
Lys Phe Lys Gly Lys Ala Ala Leu Thr Ser Asp Lys Ser Ser Ser Thr	
65 70 75 80	
gcc tac atg gag ctc agc agc ctg acc tct gag gac tct gcg gtc tat	288
Ala Tyr Met Glu Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr	
85 90 95	
tac tgt gca aga ttt ggt aac tac ggt gct ttg gac tac tgg ggc caa	336
Tyr Cys Ala Arg Phe Gly Asn Tyr Gly Ala Leu Asp Tyr Trp Gly Gln	
100 105 110	
ggg acc acg gtc acc gtc tcc tca ggt gga ggc ggt tca ggc gga ggt	384
Gly Thr Thr Val Thr Val Ser Ser Gly Gly Gly Gly Gly Gly Gly	
115 120 125	
ggc tct ggc ggt ggc gga tgc gac att gag ctc acc cag tct cca aca	432
Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu Thr Gln Ser Pro Thr	
130 135 140	
atc atg tct gca tct cca ggg gag aag gtc acc ata acc tgc agt gcc	480
Ile Met Ser Ala Ser Pro Gly Glu Lys Val Thr Ile Thr Cys Ser Ala	
145 150 155 160	
agc tca agt gta agt tac atg cac tgg ttc cag cag aag cca ggc act	528
Ser Ser Ser Val Ser Tyr Met His Trp Phe Gln Gln Lys Pro Gly Thr	
165 170 175	
tct ccc aaa ccc tgg att tat ggc aca tcc aac ctg gct tct gga gtc	576
Ser Pro Lys Pro Trp Ile Tyr Gly Thr Ser Asn Leu Ala Ser Gly Val	
180 185 190	
cct gtt cgc ttc agt ggc agt gga tct ggg acc tct tat tct ctc aca	624
Pro Val Arg Phe Ser Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr	
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Ile Ser Ser Met Glu Ala Ala Asp Ala Ala Thr Tyr Tyr Cys Gln Gln	
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Trp Ser Ser Tyr Pro Leu Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile	
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aaa cgg  
Lys Arg

726

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Trp Ile Gly Tyr Ile Asn Pro Tyr Asn Asp Gly Thr Lys Tyr Asn Glu  
50 55 60

Lys Phe Lys Gly Lys Ala Ala Leu Thr Ser Asp Lys Ser Ser Ser Thr  
65 70 75 80

Ala Tyr Met Glu Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr  
85 90 95

Tyr Cys Ala Arg Phe Gly Asn Tyr Gly Ala Leu Asp Tyr Trp Gly Gln  
100 105 110

Gly Thr Thr Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly Gly  
115 120 125

Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu Thr Gln Ser Pro Thr  
130 135 140

Ile Met Ser Ala Ser Pro Gly Glu Lys Val Thr Ile Thr Cys Ser Ala  
145 150 155 160

Ser Ser Ser Val Ser Tyr Met His Trp Phe Gln Gln Lys Pro Gly Thr  
165 170 175

Ser Pro Lys Pro Trp Ile Tyr Gly Thr Ser Asn Leu Ala Ser Gly Val  
180 185 190

Pro Val Arg Phe Ser Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu Thr  
195 200 205

Ile Ser Ser Met Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln  
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Lys Arg

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Ser Asn Tyr Trp Gly Trp Ile Arg Lys Phe Pro Gly Asn Lys Met Glu  
35 40 45  
tgg atg gga tac ata agc tac agt ggt agc act agc tac aac cca tct 192  
Trp Met Gly Tyr Ile Ser Tyr Ser Gly Ser Thr Ser Tyr Asn Pro Ser  
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ctc aaa agt cga atc tcc att act aga gac aca tcg aag aat cag ctc 240  
Leu Lys Ser Arg Ile Ser Ile Thr Arg Asp Thr Ser Lys Asn Gln Leu  
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Phe Leu Gln Leu Asn Ser Val Thr Thr Glu Asp Thr Ala Thr Tyr Tyr  
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Cys Ala Arg Tyr Ser Leu Phe Asn Tyr Gly Arg Arg Asp Tyr Val Met  
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Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu	
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acc cag tct cca gca acc atg gct gca tct cca gga gag aaa gtc acc	480
Thr Gln Ser Pro Ala Thr Met Ala Ala Ser Pro Gly Glu Lys Val Thr	
145 150 155 160	
atc acc tgc cgt gcc agc tca act gta agc tac atg cac tgg ttc caa	528
Ile Thr Cys Arg Ala Ser Ser Thr Val Ser Tyr Met His Trp Phe Gln	
165 170 175	
cag aag cca ggc gcc tcc cct aaa ccc tgg att tat gac aca tcc aaa	576
Gln Lys Pro Gly Ala Ser Pro Lys Pro Trp Ile Tyr Asp Thr Ser Lys	
180 185 190	
ctg gct tct gga gtc cca gat cgc ttc agt ggc agt ggg tct ggg aca	624
Leu Ala Ser Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr	
195 200 205	
gac ttc acc ctc acc att gat cct gtg cag gct gat gat att gca acc	672
Asp Phe Thr Leu Thr Ile Asp Pro Val Gln Ala Asp Asp Ile Ala Thr	
210 215 220	
tat tac tgt cag cag agt aag gat gat cct cgg acg ttc ggt gga ggg	720
Tyr Tyr Cys Gln Gln Ser Lys Asp Asp Pro Arg Thr Phe Gly Gly Gly	
225 230 235 240	
acc aag ctg gag ctg aaa cgg cgg ccg cag gtg cgc cgg tgc cgt atc	768
Thr Lys Leu Glu Leu Lys Arg Arg Pro Gln Val Arg Arg Cys Arg Ile	
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35 40 45	

Trp Met Gly Tyr Ile Ser Tyr Ser Gly Ser Thr Ser Tyr Asn Pro Ser  
 50 55 60  
 Leu Lys Ser Arg Ile Ser Ile Thr Arg Asp Thr Ser Lys Asn Gln Leu  
 65 70 75 80  
 Phe Leu Gln Leu Asn Ser Val Thr Thr Glu Asp Thr Ala Thr Tyr Tyr  
 85 90 95  
 Cys Ala Arg Tyr Ser Leu Phe Asn Tyr Gly Arg Arg Asp Tyr Val Met  
 100 105 110  
 Asp Ala Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser Gly Gly Gly  
 115 120 125  
 Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu  
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 Asp Phe Thr Leu Thr Ile Asp Pro Val Gln Ala Asp Asp Ile Ala Thr  
 210 215 220  
 Tyr Tyr Cys Gln Gln Ser Lys Asp Asp Pro Arg Thr Phe Gly Gly Gly  
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Gly Ala Ser Val Lys Met Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr
          20          25          30

agc tat gtt atg cac tgg gtg aag cag agc aat gga aag agc ctt gag      144
Ser Tyr Val Met His Trp Val Lys Gln Ser Asn Gly Lys Ser Leu Glu
          35          40          45

tgg att gga act att gat cct tac tat ggt ggt act agc tac aac cag      192
Trp Ile Gly Thr Ile Asp Pro Tyr Tyr Gly Gly Thr Ser Tyr Asn Gln
          50          55          60

aag ttc aag ggc aag gcc aca ttg act gta gac aaa tcc tcc acc acg      240
Lys Phe Lys Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Thr Thr
          65          70          75          80

gcc tac ata cag ctc aag agc ctg aca tct gag gac tct gca gtc tat      288
Ala Tyr Ile Gln Leu Lys Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr
          85          90          95

tac tgt gca aga tgg gat ggt tac tac gga ggg ttt tct tac tgg ggc      336
Tyr Cys Ala Arg Trp Asp Gly Tyr Tyr Gly Gly Phe Ser Tyr Trp Gly
          100          105          110

caa ggg acc atg gtc acc gtc tcc tca ggt gga ggc ggt tca ggc gga      384
Gln Gly Thr Met Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly
          115          120          125

ggg ggc tct ggc ggt ggc gga tgc gac att gag ctc acc cag tct cca      432
Gly Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu Thr Gln Ser Pro
          130          135          140

gca atc atg tct gca act cta ggg gag aag gtc acc atg agc tgc agg      480
Ala Ile Met Ser Ala Thr Leu Gly Glu Lys Val Thr Met Ser Cys Arg
          145          150          155          160

gcc agc tca aat gta aag tac atg tac tgg tac cag cag aag tca ggt      528
Ala Ser Ser Asn Val Lys Tyr Met Tyr Trp Tyr Gln Gln Lys Ser Gly
          165          170          175

gcc tcc ccc aaa cta tgg att tat tac aca tcc aac ctg gct tct gga      576
Ala Ser Pro Lys Leu Trp Ile Tyr Tyr Thr Ser Asn Leu Ala Ser Gly
          180          185          190

gtc cca gct cgc ttc agt ggc agt ggg tct ggg acc tct tat tct ctc      624
Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu
          195          200          205

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 Gln Phe Thr Ser Ser Pro Tyr Thr Phe Gly Ser Gly Thr Lys Leu Glu  
 225 230 235 240

atc aaa cgg gcg gcc gca ggt gcg ccg gtg ccg tat ccg gat ccg ctg 768  
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 20 25 30

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 35 40 45

Trp Ile Gly Thr Ile Asp Pro Tyr Tyr Gly Gly Thr Ser Tyr Asn Gln  
 50 55 60

Lys Phe Lys Gly Lys Ala Thr Leu Thr Val Asp Lys Ser Ser Thr Thr  
 65 70 75 80

Ala Tyr Ile Gln Leu Lys Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr  
 85 90 95

Tyr Cys Ala Arg Trp Asp Gly Tyr Tyr Gly Gly Phe Ser Tyr Trp Gly  
 100 105 110

Gln Gly Thr Met Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly  
 115 120 125

Gly Gly Ser Gly Gly Gly Gly Ser Asp Ile Glu Leu Thr Gln Ser Pro  
 130 135 140

Ala Ile Met Ser Ala Thr Leu Gly Glu Lys Val Thr Met Ser Cys Arg  
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Ala Ser Ser Asn Val Lys Tyr Met Tyr Trp Tyr Gln Gln Lys Ser Gly  
 165 170 175

Ala Ser Pro Lys Leu Trp Ile Tyr Tyr Thr Ser Asn Leu Ala Ser Gly  
 180 185 190

Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Ser Tyr Ser Leu  
 195 200 205

Thr Ile Ser Ser Val Glu Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln  
 210 215 220

Gln Phe Thr Ser Ser Pro Tyr Thr Phe Gly Ser Gly Thr Lys Leu Glu  
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Val Cys

<210> 28

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Ser Cys

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Ser